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First records of *Eledonoprius serrifrons* (Reitter, 1890) from Greece and *Eledona hellenica* Reitter, 1885 from Bulgaria (Coleoptera: Tenebrionidae): a contribution to the Bolitophagini of southern Balkan Peninsula with a special reference to Greece

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Abstract. The Western Palaearctic representatives of the tribe Bolitophagini comprise of seven species in three genera. Research on Bolitophagini of Greece has been minimal reporting on the presence of four species. In this paper, the rarely collected *Eledonoprius serrifrons* (Reitter, 1890) is recorded for the first time from Greece, while the Balkan species *Eledona hellenica* Reitter, 1885 is proved from Bulgaria for the first time. Material from the collection of the first author alongside a literature survey provide a distributional overview of the Greek Bolitophagini, while raising the number of known to Greek species within the tribe to five. Ecological remarks and the conservation of these two species are briefly discussed.

Key words: Tenebrioninae, Bolitophagini, mycetophagous darkling beetles.

Первые находки *Eledonoprius serrifrons* (Reitter, 1890) в Греции и *Eledona hellenica* Reitter, 1885 в Болгарии (Coleoptera: Tenebrionidae): вклад в познание Bolitophagini юга Балканского полуострова с обзором видов Греции

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Резюме. Западнопалеарктические жуки-чернотелки трибы Bolitophagini насчитывают 7 видов из 3 родов. Из Греции известно 4 вида Bolitophagini по редким указаниям в литературе. Мы впервые зарегистрировали для фауны Греции очень редкий вид *Eledonoprius serrifrons* (Reitter, 1890), а балканский *Eledona hellenica* Reitter, 1885 впервые обнаружен в Болгарии. С учетом собранного первым автором материала и тщательного анализа литературных источников число видов этой группы в Греции увеличилось до пяти, а сведения об их ареалах в стране существенно дополнены. Кратко обсуждаются экологические особенности и проблемы охраны указанных выше видов.

Ключевые слова: Tenebrioninae, Bolitophagini, жуки-чернотелки, мицетофаги.

Introduction

The darkling beetle tribe Bolitophagini includes 20 genera distributed around the world [Bouchard et al., 2021]. In the Western Palaearctic, the tribe is represented only by three genera including seven extant species, *Bolitophagus interruptus* Illiger, 1800, *B. reticulatus* (Linnaeus, 1767), *B. subinteger* Reitter, 1896, *Eledona agricola* (Herbst, 1783), *E. hellenica* Reitter, 1885, *Eledonoprius armatus* (Panzer, 1799), and *E. serrifrons* (Reitter, 1890) [Iwan et al., 2020].

Up to date, four of the mentioned species have been recorded from Greece, excluding *Bolitophagus interruptus*, *B. subinteger* and *Eledonoprius serrifrons* [Iwan et al., 2020]. In particular, *Bolitophagus reticulatus* and *Eledona agricola* are widely distributed in Europe [Iwan et al., 2020], while *E. hellenica* has been recorded from Greece and the European Turkey [Schawaller, 2002]. Although the species appears in the catalogue of Spanish Tenebrionidae, these records are considered doubtful [Fuente y Morales, 1935; Español, 1985; Carpaneto et al., 2013]. In addition,

the species is mentioned as present in Croatia only in the Fauna Europaea [Fattorini, 2013].

Eledonoprius armatus seems to be widely distributed in the Western Palaearctic extending its distribution from Azerbaijan to the Iberian Peninsula and Scandinavia towards the north [Kompantseva, Tschigel, 2000; Carpaneto et al., 2013]. In addition, it has been considered as an “Urwald relict species”, i.e. associated with old-growth forests [Müller et al., 2005]. Regarding *E. serrifrons*, known localities were elegantly presented in Sivilov and Cvetkovska-Gorgievska [2014], including seven countries. *Eledonoprius serrifrons* was first described from Azerbaijan [Reitter, 1890] followed by records from Italy [Schawaller, 2002] and Spain [Castro Tovar et al., 2008]. Follow-up studies detected the species in France (Corsica) [Soldati et al., 2009] and Armenia [Abdurakhmanov, Nabozhenko, 2011] while Syria was later added to the species’ distribution list alongside further distributional records from Italy and Spain [Carpaneto et al., 2013]. This division in the known distributional range of *E. serrifrons* [Carpaneto et al., 2013] was subsequently bridged by records from Bulgaria [Sivilov, Cvetkovska-Gorgievska, 2014].

Material and methods

Locality data on Greek Bolitophagini were extrapolated and corrected from the available scientific literature as well as specimens deposited in the private collection of the first author. The literature records are summarized in Table 1.

Bolitophagus reticulatus (Linnaeus, 1767)

Material. 1 specimen, Greece, Thessaly, Karditsa, Oxya, 39.3°N / 21.5°E, 1500 m, under the bark of rotting *Fagus sylvatica*, 24.06.1987 (G. Kakiopoulos); 1 specimen, Greece, Epirus, Ioannina, Grammos, near Kamenik peak, 40.20°N / 20.71°E, 1400 m, in *Fagus sylvatica* forest, 8.06.2019 (G. Kakiopoulos).

Eledona agricola (Herbst, 1783)

Material and observations. 7 specimens, Greece, Larissa, Stomio, Pineios river estuary, 39.87°N / 22.73°E, 5 m, on fungus growing on the bark of *Populus alba*, 3.12.1995 (G. Kakiopoulos); 5 specimens, Greece, Epirus, Plikati, Grammos Range, 40.29°N / 20.77°E, on fungus growing on the bark of *Salix* sp., 13.06.1996 (G. Kakiopoulos); observed specimen, Greece, Attica, Kaza, 38.18°N / 23.36°E, 600 m, on fungus growing on the bark of *Salix* sp., 1998 (G. Kakiopoulos); observed specimen, Greece, Western Greece, Iliia, Foloji-Koumani forest, 37.79°N / 21.75°E, on fungus growing on the bark of *Quercus* sp., 650 m, 20.11.1999 (G. Kakiopoulos); observed specimen, Greece, Western Greece, Aitolokarnania, Arakynthos, 1 km S of Ellinika vill., 38.47°N / 21.41°E, 700 m, on fungus growing on the bark of *Quercus* sp., together with *Eledonoprius serrifrons*, 27.11.2005 (G. Kakiopoulos).

Eledona hellenica Reitter, 1885

Material and observations. 1 dead specimen, Greece, Central Greece, Euboea Island, Rouklia, Ochi Mt., 38.0°N / 24.4°E, 550 m,

on fungus growing on the bark of *Platanus orientalis*, date unknown (G. Kakiopoulos); 4 specimens, Greece, Epirus, Ioannina, Vrosina, 39.64°N / 20.51°E, 600 m, on fungus growing on the bark of *Quercus* sp., 5.01.1998 (G. Kakiopoulos); 2♂ (private collection of H. Brustel, Toulouse, France), Greece, Central Greece, Euboea Island, Rouklia, Ochi Mt., 38.0°N / 24.4°E, 500 m, on fungus growing on the bark of *Quercus* sp., 19.11.2011 (G. Kakiopoulos); 6 specimens, Bulgaria, Malko Tarnovo, near Grammatikovo vill., 42.0°N / 27.6°E, and more than 50 individuals observed on large fungus (45 cm in diameter) growing on the bark of *Quercus* sp., 2.07.2004 (G. Kakiopoulos).

Note. New record for Bulgaria.

Eledonoprius armatus (Panzer, 1799)

Material. 1 specimen, Greece, West Macedonia, Grevena, Samarina vill., Smolikas Mt., 40.1°N / 20.9°E, 1900 m, on small fungus growing under the bark of *Fagus sylvatica*, 11.05.2002 (G. Kakiopoulos) (referring to the specimen in Schawaller [2002]); 3 specimens, Greece, Central Macedonia, Belles Mt., 41.3°N / 23.1°E, 1000 m, on fungus growing on the bark of rotting deciduous tree, 4.06.2010 (G. Kakiopoulos).

Eledonoprius serrifrons (Reitter, 1890)

(Fig. 1)

Material. 1 specimen, Greece, Western Greece, Aitolokarnania, Arakynthos, 1 km S of Ellinika vill., 38.47°N / 21.41°E, 700 m, on fungus growing on the bark of *Quercus* sp., 27.11.2005 (G. Kakiopoulos).

Note. New record for Greece.

Discussion

Our literature survey shows that the tribe Bolitophagini has not been adequately researched in Greece, with records of species being scarce [Oertzen, 1886; Kühnelt, 1965;

Table 1. Records of Bolitophagini in Greece, based on literature.
Таблица 1. Указания Bolitophagini для Греции в литературе.

Species Вид	Locality Местонахождение	Literature source Источник
<i>Bolitophagus reticulatus</i>	Greece: Peloponnese (as Morea) Греция: Пелопоннес (как «Morea»)	Oertzen [1886]
	Greece: East Macedonia and Thrace, Kavala, south of Chrysoupolis, Nestos River estuary / Греция: Восточная Македония и Фракия, Кавала, к югу от Хрисуполиса, устье реки Нестос	Schawaller [1996]
	Greece: East Macedonia and Thrace, Kavala, East Paggaiio Mt. Греция: Восточная Македония и Фракия, Кавала, восточная часть г. Пагайо	Schawaller [1996]
<i>Eledona agricola</i>	Greece: Aetolia Греция: Этолия	Legakis [1990]
	Greece: Akarnania Греция: Акарнания	Legakis [1990]
	Greece: Akarnania Греция: Акарнания	Oertzen [1886]
	Greece: Peloponnese (as Morea) Греция: Пелопоннес (как «Morea»)	Oertzen [1886]
	Greece: Epirus, Ioannina, Tymfi Mt., North Aristi, entrance of Vikos Gorge Греция: Эпир, Янина, г. Тимфи, Северный Аристи, вход в ущелье Викос	Schawaller [1996]
	Greece: Peloponnese, Agios Vlasios (as Hagios Wlassis) Греция: Пелопоннес, Агиос Власион (как «Hagios Wlassis»)	Kühnelt [1965]
<i>Eledona hellenica</i>	Greece: Euboea Греция: Эвбея	Oertzen [1886]
	Greece: Peloponnese, Ilea, Foloji-Koumani forest Греция: Пелопоннес, Илея, лес Фоли-Кумани	Schawaller [2002]
<i>Eledonoprius armatus</i>	Greece: Smolikas Mt., 1800 m, Fagus forest, 10.05.2002 (leg. G. Kakiopoulos) Греция: г. Смоликас, 1800 м, буковый лес, 10.05.2002 (сб. Г. Какиопулос)	Schawaller [2002]

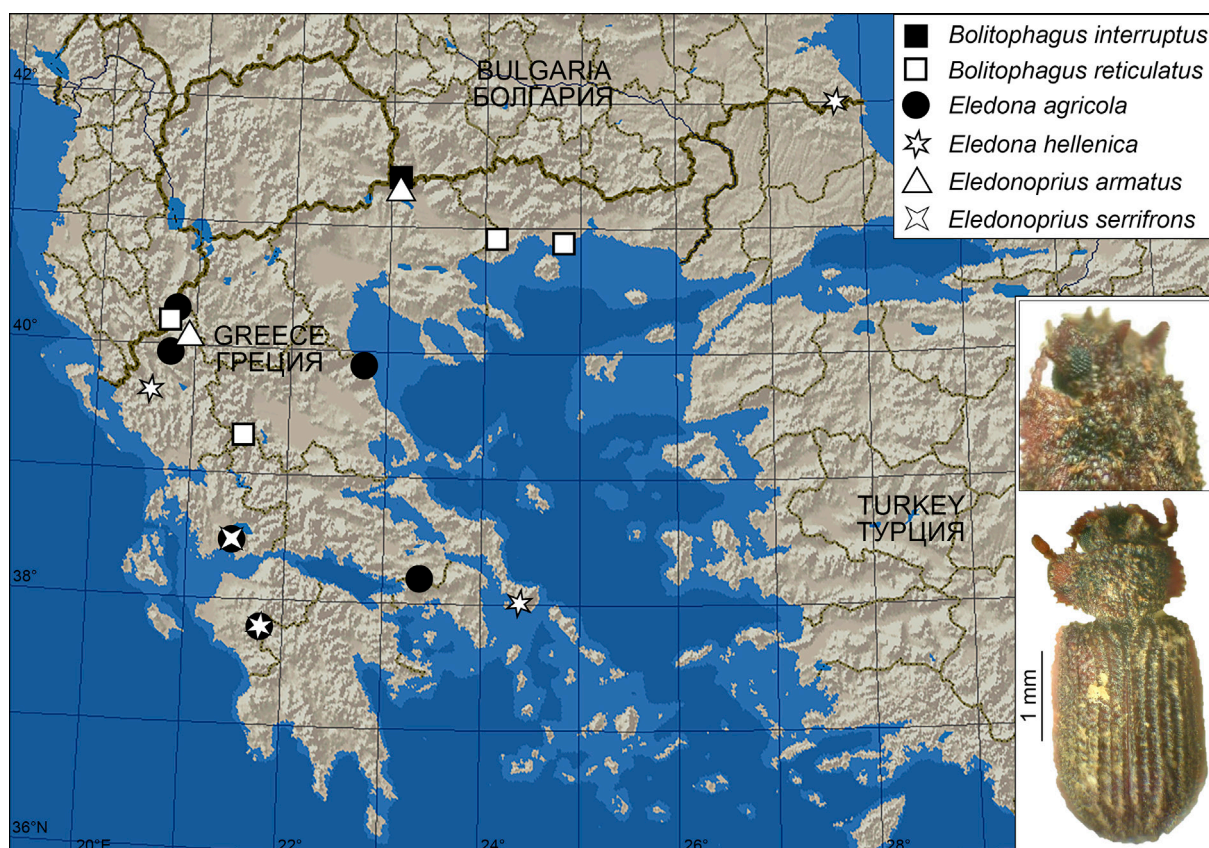


Fig. 1. Known distribution of Greek Bolitophagini including new records of *Eledona hellenica* from Bulgaria and *Eledonoprius serrifrons* from Greece. Records of Oertzen [1886] and Legakis [1990] were not mapped due to the large spatial scale of given localities. The record of *Bolitophagus interruptus* from Bulgaria was included in the map due to its close proximity to Greece. The inset shows a specimen of *Eledonoprius serrifrons* collected from Ellinika, Greece (private collection of G. Kakiopoulos).

Рис. 1. Известное распространение Болитофагини, включая новые находки *Eledona hellenica* в Болгарии и *Eledonoprius serrifrons* в Греции. Указания Эрцена [1886] и Легакиса [1990] не были картированы из-за большого пространственного разброса местонахождений. Местонахождение *Bolitophagus interruptus* в Болгарии отображено на карте из-за его непосредственной близости к Греции. На вставке – экземпляр *Eledonoprius serrifrons*, собранный в Эллинике, Греция (частная коллекция Г. Какиопулоса).

Legakis, 1990; Schawaller, 1996, 2002] (Fig. 1). Despite the small number of denoted localities, *Bolitophagus reticulatus* is a rather common species of beech forests in the country. The species has been observed by the first author in many localities (>30) but no further specimens than the examined material were collected. As for its close relative *B. interruptus*, its collection from plane trees in neighbouring Bulgaria close to the Greek-Bulgarian border [Guéorguiev, 2012] suggests its possible presence in Northern Greece, Belles Mt.

As already mentioned, *Eledona agricola* is a widespread species distributed in North Africa, Europe and the Caucasus [Schawaller, 1998; Sivilov, Cvetkovska-Gorgievska, 2014; Iwan et al., 2020] although the same may not apply to *E. hellenica*. The examined material provides the first record of the latter species in Bulgaria, supplementing its known distributional range. The collection of *E. hellenica* from Bulgaria is not a surprise because it has been reported from two bordering countries [Schawaller, 2002].

Representatives of the genus *Eledonoprius* Reitter, 1911 seem to be widespread in the Western Palearctic but are also considered rare [Kompantseva, Tschigel, 2000; Carpaneto et al., 2013; Sivilov, Cvetkovska-Gorgievska,

2014]. Records of *E. armatus* known from both Bulgaria [Dajoz, 1984; Picka, 1987] and Greece ([Schawaller, 2002]; present study) are rare, with only two localities in each country. The same applies to *E. serrifrons*, recorded for the first time from Greece (Ellinika village) and known only from one locality in Bulgaria [Sivilov, Cvetkovska-Gorgievska, 2014]. The collection of *E. serrifrons* from Greece supports a Transcaucasian-European distribution of the species, extending conjunct from Azerbaijan to the Iberian Peninsula [Sivilov, Cvetkovska-Gorgievska, 2014].

Members of the tribe Bolitophagini generally feed on fungi as adults as well as their larvae. In the Western Palearctic they are strictly associated with fungi growing on forest trees of the genera *Abies* Mill., *Castanea* Mill., *Fagus* L., *Fraxinus* Tourn. ex L., *Platanus* L., *Populus* L., and *Quercus* L. ([Schawaller, 2002; Castro Tovar et al., 2008; Soldati et al., 2009; Guéorguiev, 2012; Carpaneto et al., 2013; Sivilov, Cvetkovska-Gorgievska, 2014]; present study). Species such as *Eledonoprius armatus* are considered rare, a fact that is “probably a result of two factors: restriction of territories of the old natural deciduous forests and high trophical specialization of the species” [Kompantseva, Tschigel, 2000: 141]. Thus, further research is necessary in order to evaluate the

distribution and conservation status of Bolitophagini both on European as well as on a national levels. Considering the utilization of rotting wood, an important micro-habitat for saproxylic beetles, management actions against the major threats to saproxylic beetles (e.g. logging, tree loss and wood harvesting; urbanisation and tourism development; increase in fire frequency/intensity) [Cálix et al., 2018] could potentially benefit also rare and the range restricted species of Bolitophagini such as *Eledona hellenica* and *Eledonoprius serrifrons*.

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